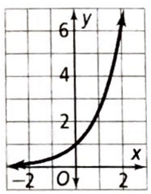
36. $q^{12}r^4$ **37.** 1.7956 **38.** $\frac{243x^3y^{11}}{16}$ **39.** $-\frac{4}{3r^{10}z^8}$ **40.** x^4
41. $a^3b^{\frac{7}{2}}$ **42.** $\frac{1}{w^3}$ **43.** $7x^4$ **44.** $\frac{n^{35}}{v^{21}}$ **45.** $\frac{e^{20}}{81c^{12}}$
46. 2×10^{-3} **47.** 2.5×10^2 **48.** 5×10^{-5}
49. 3×10^3 **50.** Answers may vary. Sample:
1) Simplify the expression within the parentheses.
2) Take the reciprocal of the rational expression raised to the third power.
3) Use the quotient raised to a power rule by applying the exponent to both the numerator and denominator.
4) Simplify the numerator.
5) Simplify the denominator using the power rule.

51. $\sqrt{m}$ **52.** $\sqrt[3]{p^2}\sqrt[5]{r^4}$ **53.** $6x^2$ **54.** $5\sqrt[3]{x}$
55. $8\sqrt[4]{x^3}$ **56.** $x\sqrt[3]{25}\sqrt{y}$ **57.** $(xy)^{\frac{1}{2}}$ **58.** $a^{\frac{1}{4}}$ **59.** $b^{\frac{2}{3}}$
60. x^2y^3 **61.** $3x^{\frac{1}{2}}$ **62.** $x^{\frac{2}{5}}y^{\frac{3}{5}}$ **63.** 4, 16, 64
64. 0.01, 0.0001, 0.000001 **65.** 20, 10, 5
66. 6, 12, 24

67.


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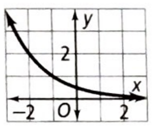

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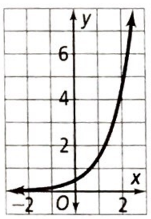

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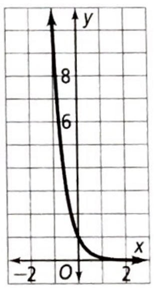


71a. 800 bacteria **b.** about 1.4×10^{16} bacteria
72. exponential growth; 3 **73.** exponential decay; 0.32
74. exponential growth; $\frac{3}{2}$ **75.** exponential decay; $\frac{1}{4}$
76. \$2697.20 **77.** 463 people **78.** 2 **79.** 10 **80.** $\frac{1}{5}$
81. $\frac{1}{3}$ **82.** $a_1 = 20$, $a_n = a_{n-1} \cdot 3$
83. $a_1 = 5$, $a_n = a_{n-1} \cdot \frac{1}{2}$ **84.** $a_1 = 3$, $a_n = a_{n-1} \cdot 4$
85. $a_1 = 10$, $a_n = a_{n-1} \cdot \frac{1}{10}$

Chapter 8

Get Ready! p. 483

1. 1, 2, 3, 4, 6, 12 **2.** 1, 2, 3, 6, 9, 18 **3.** 1, 2, 4, 5, 10, 20, 25, 50, 100 **4.** 1, 3, 9, 27, 81 **5.** 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72 **6.** 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 25, 30, 50, 60, 75, 100, 150, 300 **7.** 1, 2, 5, 10, 25, 50, 125, 250
8. 1, 3, 9, 23, 69, 207 **9.** $x^2 - 9x$ **10.** $3d + 15$
11. $24r^2 - 15r$ **12.** $34m - 29$ **13.** $-36a^2 - 6a$
14. $-s^2 - 7s - 2$ **15.** $25x^2$ **16.** $9v^{\frac{5}{2}}$ **17.** $64c^6$
18. $56m^{\frac{28}{5}}$ **19.** $81b^6$ **20.** $36p^2q^2$ **21.** $7n$ **22.** $-125t^{12}$
23. p^2q^3 **24.** $5x$ **25.** $-\frac{1}{8n^5}$ **26.** $3y^2$ **27.** 3
28. A binomial is an expression with two terms.
29. b; $(x + 4)(x + 4) = (x + 4)^2$, which is a square, and $(x + 4)(x + 4) = x^2 + 8x + 16$, which is a trinomial.

Lesson 8-1 pp. 486–491

Got It? 1a. 2 **b.** 5 **c.** 0 **2.** $5x^4$, $-5x^2y^4$
3a. $8x^2 + 2x - 3$, quadratic trinomial **b.** Answers may vary. Sample: Writing a polynomial in standard form allows you to see which monomial term has the greatest degree and how many terms the polynomial has.
4. $-12x^3 + 120x^2 - 255x + 6022$
5. $-4m^3 - 4m^2 - 2m + 21$

Lesson Check 1. 4 **2.** 5 **3.** $11r^3 + 11$
4. $x^2 - 3x - 7$ **5.** quadratic trinomial **6.** linear binomial **7.** The coefficient of the sum of like monomials is the sum of the coefficients. To add polynomials, you group like terms and add their coefficients. A monomial has only one term and a polynomial can have more than one term.

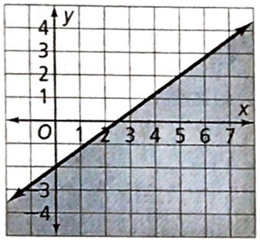
Exercises 9. 3 **11.** 10 **13.** 0 **15.** no degree
17. $11m^3n^3$ **19.** $14t^4$ **21.** $18v^4w^3$
23. $-8bc^4$ **25.** $-2q + 7$; linear binomial
27. $-7x^2 - 4x + 4$; quadratic trinomial
29. $3z^4 - 2z^2 - 5z$; fourth degree trinomial
31. $9x^2 + 8$ **33.** $20x^2 + 5$ **35.** $-18x^2 + 228x + 2300$
37. $2x^3 + 8$ **39.** $5h^4 + h^3$ **41.** $9x - 1$
43. The student forgot to distribute the negative sign to all the terms in the second set of parentheses.
$(4x^2 - x + 3) - (3x^2 - 5x - 6) =$
$4x^2 - x + 3 - 3x^2 - (-5x) - (-6) =$
$4x^2 - 3x^2 - x + 5x + 3 + 6 =$
$x^2 + 4x + 9$ **45.** $-5y^3 + 2y^2 - 6$
47. $3z^3 + 15z^2 - 10z - 5$ **49.** No. Answers may vary. Sample: $(x^2 - x + 3) + (x - x^2 + 1) = 4$, which is a monomial. **51.** $14pq^6 - 11p^4q - p^4q^4$

Lesson 8-2 pp. 492–496

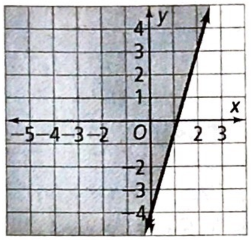
Got It? 1. $15n^4 - 5n^3 + 40n$ **2.** $3x$
3a. $3x^2(3x^4 + 5x^2 + 4)$ **b.** $-6x^2(x^2 + 3x + 2)$
4. $9x^2(4 - \pi)$

Lesson Check 1. $12x^4 + 42x^2$ **2.** $2a^2$ **3.** $3m(2m - 5)$
4. $4x(x^2 + 2x + 3)$ **5.** B **6.** C **7.** A **8.** Answers may vary. Sample: $18x^3 + 27x^2$

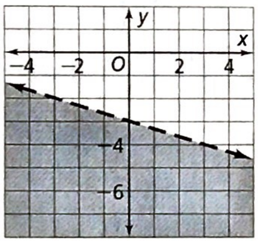
Exercises 9. $7x^2 + 28x$ **11.** $30m^2 + 3m^3$ **13.** $8x^4 - 28x^3 + 4x^2$ **15.** 4 **17.** 9 **19.** 4 **21.** $3(3x - 2)$
23. $7(2n^3 - 5n^2 + 4)$ **25.** $2x(7x^2 - x + 4)$
27. $25x^2(9 - \pi)$ **29.** $-10x^3 + 8x^2 - 26x$
31. $-60a^3 + 20a^2 - 70a$ **33.** $-t^3 + t^2 + t$
35. $20x^2 + 5x$; $5x(4x + 1)$ **37.** $17xy^3(y + 3x)$
39. $a^5(31ab^3 + 63)$ **41.** 49; $p = 7a$ and $q = 7b$, where a and b have no common factors other than 1, so $p^2 = 49a^2$ and $q^2 = 49b^2$. Since a^2 and b^2 have no common factors other than 1, the GCF of p^2 and q^2 is 49. **43a.** $V = 64s^3$ **b.** $V = 48(\pi)s^2$
c. $V = 64s^3 - 48(\pi)s^2$ **d.** $V = 16s^2(4s - 3\pi)$ **e.** about 182,088 in.^{3} **45.** $\frac{1}{3}$ **47.** $16x^5$; 5 **49.** $8x^2 + 4x + 5$
50. $7x^4 + 3x^2 - 1$ **51.** $-5x^3 - 6x$
52. $7x^4 + 2x^3 - 8x^2 + 4$
53. $y \le \frac{4}{5}x - 2$



54. $y \ge \frac{7}{2}x - 4$



55. $y < -\frac{1}{3}x - 3$



56. $8x - 40$ **57.** $-3w - 12$ **58.** $1.5c + 4$

Lesson 8-3 pp. 498–503

Got It? 1. $4x^2 - 21x - 18$ **2.** $3x^2 + 13x + 4$
3a. $3x^2 + 2x - 8$ **b.** $4n^2 - 31n + 42$
c. $4p^3 - 10p^2 + 6p - 15$ **4.** $4\pi x^2 + 20\pi x + 24\pi$
5a. $2x^3 - 9x^2 + 10x - 3$ **b.** Answers may vary. Sample: Distribute the trinomial to each term of the binomial. Then continue distributing and combining like terms as needed.

Lesson Check 1. $x^2 + 9x + 18$ **2.** $2x^2 + x - 15$
3. $x^3 + 5x^2 + 2x - 8$ **4.** $x^2 + 2x - 15$ **5.** Find the sum of the products of the FIRST terms, OUTER terms, INNER terms, and LAST terms. **6.** $3x^2 + 11x + 8$ **7.** The degree of the product is the sum of the degrees of the two polynomials.

Exercises 9. $y^2 + 5y - 24$ **11.** $c^2 - 15c + 50$
13. $6x^2 + 13x - 28$ **15.** $a^2 - 12a + 11$
17. $2h^2 + 11h - 63$ **19.** $6p^2 + 23p + 20$
21. $4x^2 + 11x - 20$ **23.** $b^2 - 12b + 27$
25. $45z^2 - 7z - 12$ **27.** $4w^2 + 21w + 26$
29. $4\pi x^2 + 22\pi x + 28\pi$ **31.** $x^3 + 2x^2 - 14x + 5$
33. $10a^3 + 12a^2 + 9a - 20$ **35.** $x^2 + 200x + 9375$
37. $-n^3 - 3n^2 - n - 3$ **39.** $2m^3 + 10m^2 + m + 5$
41. $12z^4 + 4z^3 + 3z^2 + z$ **43.** Yes, when you multiply two polynomials you get a sum of monomials. A sum of monomials is always a polynomial. **45a. i.** $x^2 + 2x + 1$, 121 **ii.** $x^2 + 3x + 2$, 132 **iii.** $x^2 + 4x + 3$, 143
b. The digits in the product of the two integers are the coefficients of the terms in the product of the two binomials. **47.** $6x^2 + 24x + 24$ **49.** $24c^4 + 72c^2 + 54$

Lesson 8-4 pp. 504–50

Got It? 1a. $n^2 - 14n + 49$ **b.** $4x^2 + 36x + 81$
2. $(16x + 64)$ ft^2 **3a.** 7225 **b.** Answers may vary. Sample: You could write 85 as $(80 + 5)$ or as $(100 - 1$
4a. $x^2 - 81$ **b.** $36 - m^4$ **c.** $9c^2 - 16$ **5.** 2496
Lesson Check 1. $c^2 + 6c + 9$ **2.** $g^2 - 8g + 16$
3. $4r^2 - 9$ **4.** $4x^2 + 12x + 9$ in.^{2} **5.** The Square of a Binomial **6.** The Product of a Sum and Difference **7.** The Square of a Binomial **8.** Answers may vary. Sample: You can use the rule for the product of a sum and difference to multiply two numbers when one number can be written as $a + b$ and the other number can be written as $a - b$.

Exercises 9. $w^2 + 10w + 25$ **11.** $9s^2 + 54s + 81$
13. $a^2 - 16a + 64$ **15.** $25m^2 - 20m + 4$
17. $(10x + 15)$ units^2 **19.** $36 - x^2$ in.^{2} **21.** 6241
23. 162,409 **25.** $v^2 - 36$ **27.** $z^2 - 25$ **29.** $100 - y^2$
31. 1596 **33.** 3591 **35.** 89,991 **37.** $4a^2 + 4ab + b^2$
39. $g^2 - 14gh + 49h^2$ **41.** $64r^2 - 80rs + 25s^2$
43. $p^8 - 18p^4q^2 + 81q^4$ **45.** $a^2 - 36b^2$ **47.** $r^4 - 9s^2$
49. $9w^6 - z^4$ **51.** $8x^2 + 32x + 32$
53. Answers may vary. Sample:
$a^2 = b(a - b) + b^2 + (a - b)^2 + b(a - b)$ Area of big square = sum of areas of the 4 interior rectangles
$= 2b(a - b) + b^2 + (a - b)^2$ Combine like terms.
$= 2ab - 2b^2 + b^2 + (a - b)^2$ Distributive Property
$= 2ab - b^2 + (a - b)^2$ Combine like terms.
So, $(a - b)^2 = a^2 - 2ab + b^2$ by the Add. and Subtr. Prop. of = .

55. No; $\left(3\frac{1}{2}\right)^2 = \left(3 + \frac{1}{2}\right)^2 = \left(3 + \frac{1}{2}\right)\left(3 + \frac{1}{2}\right) = 3^2 + 2(3)\left(\frac{1}{2}\right) + \left(\frac{1}{2}\right)^2 = 9 + 3 + \frac{1}{4} = 12\frac{1}{4} \neq 9\frac{1}{4}$

57a. $(3m + 1)^2 = 9m^2 + 6m + 1 = 3(3m^2 + 2m) + 1$ Since $3(3m^2 + 2m)$ is a multiple of 3, the expression on the right is 1 more than a multiple of 3. **b.** no; $(3m + 2)^2 = 3(3m^2 + 4m) + 4$ **59.** C **61.** The graph shows a line passing through (4, 0) and (0, 5). Both sides of the graph are shaded, but there is no overlap.

The solutions are the coordinates of the points on the line with equation $5x + 4y = 20$.
62. $6x^2 - 11x - 10$ **63.** $24m^2 - 34m + 7$ **64.** $5x^2 + 53x + 72$ **65.** decrease of 25% **66.** increase of 25% **67.** increase of 25% **68.** decrease of 12.5% **69.** $6x(2x^3 + 5x^2 + 7)$ **70.** $9(8x^3 + 6x^2 + 3)$ **71.** $7x(5x^2 + x + 9)$

Lesson 8-5 pp. 512–517

Got It? 1. $(r + 8)(r + 3)$ **2a.** $(y - 4)(y - 2)$ **b.** No. There are no factors of 2 with sum -1. **3a.** $(n + 12)(n - 3)$ **b.** $(c - 7)(c + 3)$ **4.** $x + 8$ and $x - 9$ **5.** $(m + 9n)(m - 3n)$

Lesson Check 1. $(x + 4)(x + 3)$ **2.** $(r - 7)(r - 6)$ **3.** $(p + 8)(p - 5)$ **4.** $(a + 4b)(a + 8b)$ **5.** $n - 7$ and $n + 4$ **6.** positive **7.** positive **8.** negative **9.** when the constant term is positive and the coefficient of the second term is negative

Exercises 11. 2 **13.** 2 **15.** $(t + 2)(t + 8)$ **17.** $(n - 7)(n - 8)$ **19.** $(q - 6)(q - 2)$ **21.** 6 **23.** 1 **25.** $(w + 1)(w - 8)$ **27.** $(x + 6)(x - 1)$ **29.** $(n + 2)(n - 5)$ **31.** $r - 4$ and $r + 1$ **33.** A **35.** $(r + 9s)(r + 10s)$ **37.** $(m - 7n)(m + 4n)$ **39.** $(w - 10z)(w - 4z)$ **41a.** p and q must have the same sign. **b.** p and q must have opposite signs. **43.** $x - 12$ **45.** $4x^2 + 12x + 5$; $(2x + 5)(2x + 1)$ **47a.** They are opposites. **b.** Since the coefficient of the middle term is negative, the number with the greater absolute value must be negative. So, p must be a negative integer. **49.** $(x + 25)(x + 2)$ **51.** $(k - 21)(k + 3)$ **53.** $(s + 5t)(s - 15t)$ **55.** $(x^6 + 7)(x^6 + 5)$ **57.** $(r^3 - 16)(r^3 - 5)$ **59.** $(x^6 - 24)(x^6 + 5)$ **61.** C **63.** A **65.** $c^2 + 8c + 16$ **66.** $4v^2 - 36v + 81$ **67.** $9w^2 - 49$ **68.** $\frac{ad}{b}$ **69.** $\frac{8d}{7}$ **70.** $mn - c$ **71.** $7x$ **72.** 6 **73.** 3

Lesson 8-6 pp. 518–522

Got It? 1a. $(3x + 5)(2x + 1)$ **b.** The factors are both negative. **2.** $(2x + 7)(5x - 2)$ **3.** $2x + 3$ and $4x + 5$ **4.** $4(2x + 1)(x - 5)$

Lesson Check 1. $(3x + 1)(x + 5)$ **2.** $(5q + 2)(2q + 1)$ **3.** $(2w - 1)(2w + 3)$ **4.** $3x + 8$ and $2x - 9$ **5.** There are no factors of 20 with sum 7. **6.** 24 **7.** Answers may vary. Sample: If $a = 1$, you look for factors of c whose sum is b. If $a \neq 1$, you look for factors of ac whose sum is b.

Exercises 9. $(3d + 2)(d + 7)$ **11.** $(4p + 3)(p + 1)$ **13.** $(2g - 3)(4g - 1)$ **15.** $(2k + 3)(k - 8)$ **17.** $(3x - 4)(x + 9)$ **19.** $(2d + 5)(2d - 7)$ **21.** $5x + 2$ and $3x - 4$ **23.** $2(4v - 3)(v + 5)$ **25.** $5(w - 2)(4w - 1)$ **27.** $3(3r - 5)(r + 2)$ **29–33.** Answers may vary. Samples are given. **29.** -31, $(5v + 3)(3v - 8)$; 31, $(5v - 3)(3v + 8)$ **31.** 20, $(3g + 2)(3g + 2)$; 15, $(3g + 1)(3g + 4)$ **33.** 41, $(8r - 7)(r + 6)$; -5, $(8r - 21)(r + 2)$ **35.** $6x + 4$ **37a.** $(2x + 2)(x + 2)$; $(x + 1)(2x + 4)$ **b.** yes **c.** Answers may vary. Sample: Neither factoring is complete. Each one has a common factor, 2. **39.** $3(11k + 4)(2k + 1)$ **41.** $28(h - 1)(h + 2)$ **43.** $(11n - 6)(5n - 2)$ **45.** $(9g - 5)(7g - 6)$ **47.** 2; explanations may vary. Sample: $ax^2 + bx + c$ factors to $(ax + 1)(x + c)$ or $(ax + c)(x + 1)$ so $b = ac + 1$ or $b = a + c$. **49.** $(7p - 3q)(7p + 12q)$ **51a.** -2, -3 **b.** $(x + 2)(x + 3)$ **c.** Answers may vary. Sample: if you set each factor equal to 0 and solve the resulting equations, you get the x–intercepts.

Lesson 8-7 pp. 523–528

Got It? 1a. $(x + 3)^2$ **b.** $(x - 7)^2$ **2.** $4m - 9$ **3a.** $(v - 10)(v + 10)$ **b.** $(s - 4)(s + 4)$ **4a.** $(5d + 8)(5d - 8)$ **b.** No; $25d^2 + 64$ is not a difference of two squares. **5a.** $12(t + 2)(t - 2)$ **b.** $3(2x + 1)^2$

Lesson Check 1. $(y - 8)^2$ **2.** $(3q + 2)^2$ **3.** $(p + 6)(p - 6)$ **4.** $6w + 5$ **5.** perfect-square trinomial **6.** perfect-square trinomial **7.** difference of two squares **8.** In a difference of two squares, both terms are perfect squares separated by a subtraction symbol.

Exercises 9. $(h + 4)^2$ **11.** $(d - 10)^2$ **13.** $(q + 1)^2$ **15.** $(8x + 7)^2$ **17.** $(3n - 7)^2$ **19.** $(5z + 4)^2$ **21.** $10r - 11$ **23.** $5r + 3$ **25.** $(a + 7)(a - 7)$ **27.** $(t + 5)(t - 5)$ **29.** $(m + 15)(m - 15)$ **31.** $(9r + 1)(9r - 1)$ **33.** $(8q + 9)(8q - 9)$ **35.** $(3n + 20)(3n - 20)$ **37.** $3(3w + 2)(3w - 2)$ **39.** $(x^2)^2 - (y^2)^2$; $(x - y)(x + y)(x^2 + y^2)$ **41.** Answers may vary. Sample: Rewrite the absolute value of both terms as squares. The factorization is the product of two binomials. The first is the sum of square roots of the squares. The second is the difference of the square roots of the squares. Example 1: $x^2 - 4 = (x + 2)(x - 2)$; Example 2: $4y^2 - 25 = (2y + 5)(2y - 5)$
43. [1] Subtract by combining like terms.
$(49x^2 - 56x + 16) - (16x^2 + 24x + 9) =$
$(49x^2 - 16x^2) + (-56x - 24x) + (16 - 9) =$
$33x^2 - 80x + 7$
[2] Factor each expression, then use the rule for factoring the difference of two squares. $(49x^2 - 56x + 16) - (16x^2 + 24x + 9) = (7x - 4)^2 - (4x + 3)^2 =$
$[(7x - 4) - (4x + 3)] - [(7x - 4) + (4x + 3)] =$
$(3x - 7)(11x - 1) = 33x^2 - 80x + 7$
45. 11, 9 **47.** 14, 6 **49a.** Answers may vary. Sample: $x^2 + 6x + 9$ **b.** because the first term x^2 is a square, the last term 3^2 is a square, and the middle term is $2(x)(3)$ **51.** $(8r^3 - 9)^2$ **53.** $(6m^2 + 7)^2$ **55.** $(x^{10} - 2y^5)^2$

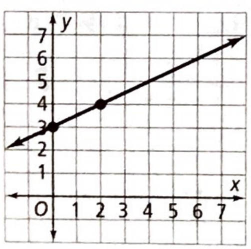
Selected **Answers**

57a. $(4 + 9n^2)(2 + 3n)(2 - 3n)$ **b.** They are squares of square terms. **c.** Answers may vary. Sample: $16x^4 - 1$ **59.** H **61a.** $c = 190 - 2p$ **b.** graph of a line through (0, 200), (1, 198), (2, 196), (3, 194), (4, 192), (5, 190)
62. $(6x + 7)(3x - 2)$ **63.** $(2x + 3)(4x + 3)$
64. $(4x - 7)(3x - 5)$ **65.** 2 **66.** $3m$ **67.** $4h^2$

Lesson 8-8 pp. 529–533

Got It? 1a. $(2t^2 + 5)(4t + 7)$ **b.** Answers may vary. Sample: In Lesson 8-6, you rewrote the middle term as the sum of two terms and then factored by grouping. In this problem, there were already two middle terms.
2. $3h(h^2 + 2)(2h + 3)$ **3.** Answers may vary. Sample: $2x$, $5x + 2$, and $6x + 1$
Lesson Check 1. $(4r^2 + 3)(5r + 2)$
2. $(3d^2 - 5)(2d + 1)$ **3.** $6(2x^2 + 3)(2x + 5)$
4. Answers may vary. Sample: $4x$, $3x + 1$, and $3x + 2$
5. No; the polynomial is a perfect square. **6.** Yes; when you write $23w$ as $20w + 3w$ the resulting two groups of terms have the same factor, $w + 5$. **7.** Yes; two groups of terms have the same factor, $4t - 7$. **8.** No; when you factor out the GCF from each pair of terms, there is no common factor.
Exercises 9. $2z^2$, 3 **11.** $2r^2$, -5 **13.** $(5q^2 + 1)(3q + 8)$
15. $(7z^2 + 8)(2z - 5)$ **17.** $(2m + 1)(2m - 1)(2m + 3)$
19. $(4v^2 - 5)(5v + 6)$ **21.** $(4y^2 - 3)(3y + 1)$
23. $w(w^2 + 6)(3w - 2)$ **25.** $3q(q + 2)(q - 2)(2q + 1)$
27. $2(d^2 + 4)(2d - 3)$ **29.** Answers may vary. Sample: $4c$, $c + 8$, and $c + 5$ **31.** $9t(t - 8)(t - 2)$
33. $8(m^2 + 5)(m + 4)$ **35.** The factorization is correct, but it is not complete. The GCF of all the terms is $4x$, not 4. $4x^4 + 12x^3 + 8x^2 + 24x = 4x(x^3 + 3x^2 + 2x + 6) = 4x[x^2(x + 3) + 2(x + 3)] = 4x(x^2 + 2)(x + 3)$
37. Answers may vary. Sample: Split the expression into three binomials. Find the GCF of each binomial, then factor again. **39.** Answers may vary. Sample: $30x^3 + 36x^2 + 40x + 48 = 2(3x^2 + 4)(5x + 6)$
41. $(y + 2)(y - 2)(y + 11)$ **43.** $(6g^3 - 7h^2)(5g^2 + 4h)$
45. $(2^3 + 2^0)(2^2 + 2^1 + 2^0)$; 9(7) **47.** D **49.** B
51. $5r(2r^2 + 1)(r + 3)$ **52.** $(m + 6)^2$ **53.** $(8x - 9)^2$
54. $(7p + 2)(7p - 2)$ **55.** not a function
56. function **57.** function

58.



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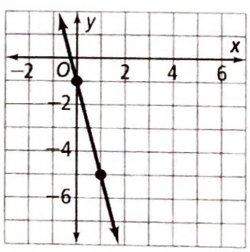

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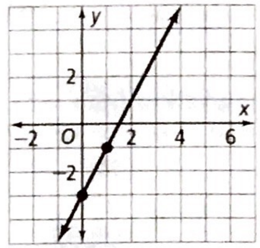

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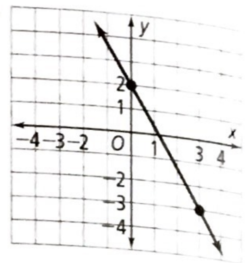


Chapter Review pp. 535–538

1. binomial **2.** polynomial **3.** monomial **4.** perfect-square trinomial **5.** degree of the monomial
6. $-9r^2 + 11r + 3$; quadratic trinomial **7.** $b^3 + b^2 + 3$; cubic trinomial **8.** $8t^2 + 3$; quadratic binomial
9. $4n^5 + n$; fifth degree binomial **10.** $6x + 8$; linear binomial **11.** p^3q^3; sixth degree monomial **12.** $v^3 + 5$
13. $14s^4 - 4s^2 + 9s + 7$ **14.** $9h^3 - 3h + 3$
15. $7z^3 - 2z^2 - 16$ **16.** $-20k^2 + 15k$
17. $36m^3 + 8m^2 - 24m$ **18.** $6g^3 - 48g^2$
19. $3d^3 + 18d^2$ **20.** $-8n^4 - 10n^3 + 18n^2$
21. $-2q^3 + 8q^2 + 11q$ **22.** $4p(3p^3 + 4p^2 + 2)$
23. $3b(b^3 - 3b + 2)$ **24.** $9c(5c^4 - 7c^2 + 3)$
25. $4g(g + 2)$ **26.** $3(t^4 - 2t^3 - 3t + 4)$
27. $3h^3(10h^2 - 2h - 5)$ **28.** 30; if the GCF of p and q is 5, then the GCF of $6p$ and $6q$ is $6(5) = 30$.
29. $w^2 + 13w + 12$ **30.** $10s^2 - 7s - 12$
31. $9r^2 - 12r + 4$ **32.** $6g^2 - 41g - 56$
33. $21q^2 + 62q + 16$ **34.** $12n^4 + 20n^3 + 15n + 25$
35. $t^2 + 6t - 27$ **36.** $36c^2 + 60c + 25$
37. $49h^2 - 9$ **38.** $3y^2 - 11y - 42$
39. $32a^2 - 44a - 21$ **40.** $16b^2 - 9$
41. $(3x + 5)(x + 7)$; $3x^2 + 26x + 35$
42. $(g - 7)(g + 2)$ **43.** $(2n - 1)(n + 2)$
44. $2(3k - 2\ell)(k - \ell)$ **45.** $(p + 6)(p + 2)$
46. $(r + 10)(r - 4)$ **47.** $(2m + n)(3m + 11n)$
48. $(t + 2)(t - 15)$ **49.** $(2g - 1)(g - 17)$
50. $3(x + 2)(x - 1)$ **51.** $(d - 3)(d - 15)$
52. $(w + 3)(w - 18)$ **53.** $7(3z - 7)(z - 1)$
54. $-2(h - 7)(h + 5)$ **55.** $(x + 2)(x + 19)$
56. $(5v + 8)(2v - 1)$ **57.** $5(g + 2)(g + 1)$ **58.** Answers may vary. Sample: If the expression is factorable then there must be factors of 18 whose sum is $b = 15$. The factors of 18 are 1 and 18, 2 and 9, 3 and 6. None of these have a sum equal to 15, so the expression is not factorable. **59.** $(s - 10)^2$
60. $(4q + 7)^2$ **61.** $(r + 8)(r - 8)$ **62.** $(3z + 4)(3z - 4)$
63. $(5m + 8)^2$ **64.** $(7n + 2)(7n - 2)$
65. $(g + 15)(g - 15)$ **66.** $(3p - 7)^2$ **67.** $(6h - 1)^2$
68. $(w + 12)^2$ **69.** $8(2v + 1)(2v - 1)$

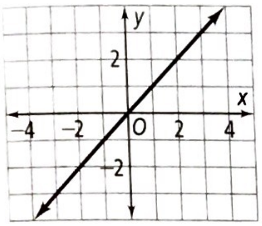
70. $(5x-6)(5x+6)$ **71.** $3n+9$ **72.** It is a perfect-square trinomial. **73.** $3y^2$; 1 **74.** $8m^2$; 3 **75.** $2d(d+1)(d-1)(3d+2)$ **76.** $(b^2+1)(11b-6)$ **77.** $(5z^2+1)(9z+4)$ **78.** $3(a^2+2)(3a-4)$

Chapter 9

Get Ready! p. 543

1. −13 **2.** −3.5 **3.** −9 **4.** −0.5 **5.** −23 **6.** −3

7.



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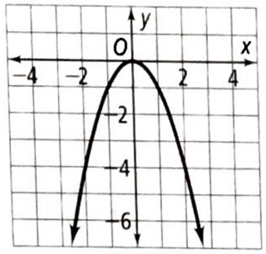

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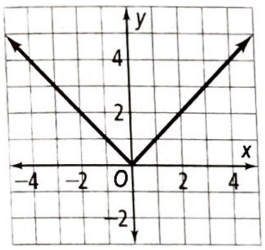

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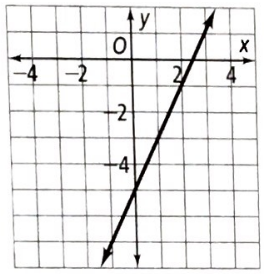

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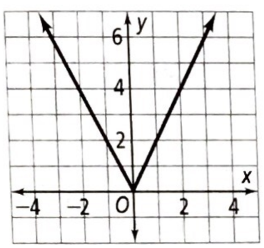

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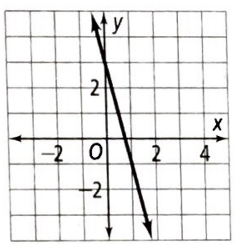
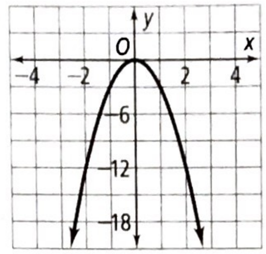


13. −108 **14.** 0 **15.** 49 **16.** 25 **17.** 24 **18.** 144
19. $(2x+1)^2$ **20.** $(5x-3)(x+7)$
21. $(4x-3)(2x-1)$
22. $(x-9)^2$ **23.** $(6y-5)(2y+3)$
24. $(m-9)(m+2)$
25. A quadratic function is of the form $f(x)=ax^2+bx+c$, where $a \neq 0$. **26.** Answers will vary. Sample: You can fold the graph along the axis of symmetry and the two halves of the graph will match. **27.** Answers will vary. Sample: the product of two factors can only be zero if at least one of the factors is zero.

Lesson 9-1 pp. 546–552

Got It? 1. (−2, −3); minimum

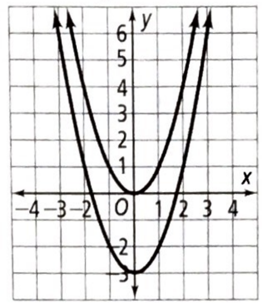
2.



domain: all real numbers, range: $y \leq 0$

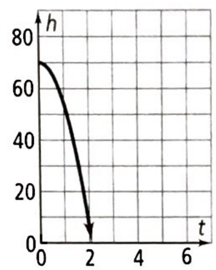
3. $f(x)=-\frac{1}{3}x^2$, $f(x)=-x^2$, $f(x)=3x^2$

4.



Answers will vary. Sample: They have the same shape, but the second parabola is shifted down 3 units.

5a.

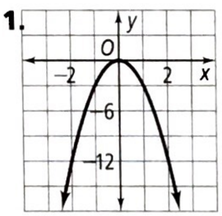


about 2 s

b. domain: $0 \leq t \leq 1.2$; range: $0 \leq h \leq 20$

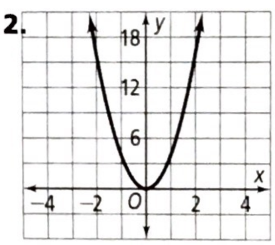
Lesson Check

1.



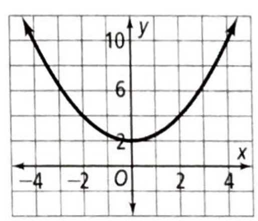
(0, 0)

2.



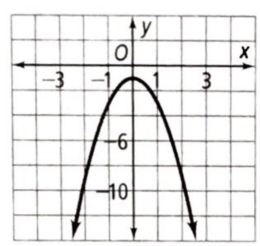
(0, 0)

3.



(0, 2)

4.



(0, −1)

5. If $a>0$, the vertex is a minimum. If $a<0$, the vertex is a maximum. **6.** Answers will vary. Sample: They have the same shape, but the second graph is shifted up 1 unit.